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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/241,851 02/02/99 NAKAI

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EXAMINER

CHANG, A

ART UNIT

PAPER NUMBER

2872

DATE MAILED:

05/03/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/241,851

Applicant(s)

Nakai

Examiner

Audrey Chang

Group Art Unit

2872



☒ Responsive to communication(s) filed on Feb 14, 2000

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-7 and 9-19 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-7 and 9-19 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 7

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Remark

1. This Office Action is in response to applicant's amendment filed on February 14, 2000 which has been entered as paper number 9.
2. By this amendment, claims 1-7 have been amended, claim 8 has been canceled and claims 9-19 have been newly added by the applicant. Claims 1-7 and 9-19 remain pending in this application.
3. The rejection to claims 1-3, 5-6 and 8 under 35 USC 112, second paragraph, set forth in the previous Office Action dated August 13, 1999, paper number 5, remains valid.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-7, and 9-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "a maximum optical path length difference ... with respect to each of at least two wavelengths is integer times an associated wavelength" recited in claims 1-7 and 9-12 appears to be vague and indefinite since it is not clear what is this "associated wavelength"? It is not clear if this associated wavelength is a third wavelength or is one of the "at least two wavelengths". The applicant is once again reminded respectfully that an "optical path length" is by definition the multiplication of a physical length, or size, of an object, such as the diffractive grating or the space in this case, and the refractive index of the

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object. It is therefore a definite and fixed quantity with respect to the actual size of the object. It is understood in the art to select or design the size of the object so that the optical length or difference of such quantity to be a multiple of a wavelength, in order to give desired diffraction phenomena, and this particular wavelength is understood as the design wavelength. The claims as stand now fail to give a clear and logical relationships among these “at least two wavelengths”. It also does not give a clear and definite description to the “associated wavelength”. These confusions and indefiniteness therefore make the scope of the claims unclear. Claims 13-19 inherit the rejections from all of the claims.

The phrase “ a length of a flat plane ... “ recited in claim 18 appears to be vague and indefinite since it is not clear what is the term “flat plane” referred to. The phrase “the curved surface” recited in claim 19 appears to be vague and indefinite since it lacks proper antecedent basis from its based claims. If the flat plane and the curved surface are referred to the chamfered shape of the gratings then such limitations and connection should be definitely and positively stated. The applicant is respectfully reminded that claims 1, 11 and 12 do not disclose the chamfered shape. This means that the dependency of claims 18 and 19 from these claims would result a lacking of antecedent basis from its based claims.

Clarifications are definitely required.

Allowable Subject Matter

6. The indicated allowability of claims 2-3 and 8/2-3 is withdrawn in view of the newly discovered reference(s) to US patent issued to Sakai et al (PN. 5,279,924). Rejections based on the newly cited reference(s) follow.

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Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1 and newly added claims 11-12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the patent issued to Gerritsen et al (PN. 5,048,925).

The reasons for rejection are set forth in the previous Office Action dated August 13, 1999. The newly added claims 11-12 recites the same or similar features as in the original claim 1 and they are rejected for the same reasons. The rejection are repeated as follows.

Gerritsen et al teaches a volume diffracting structure that is comprised of a pair of diffraction gratings (60 and 61) that are confronting each other through an air gap (64) wherein the pair of gratings are made of materials having different diffractive indices, which normally also differs in dispersion property, (please Figure 6 and column 2). This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the maximum optical path difference is an integer multiple of a design wavelength however such property is either inherently met by the physical structure of the grating pair or an obvious modification to one skilled in the art since only when the optical path length difference introduced by the grating structure equals an integer multiple of the wavelength the interference between the light passes through the grating structure would be constructive. A destructive interference between the light beams pass through the grating structure would lead to cancellation between the light beams. It is also the fundamental theory of diffraction that the optical path length difference introduced by diffraction element can only be ranged between zero and a multiple of the design wavelength, with of course the multiple of design

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wavelength being the maximum value, and the different values of the optical path length difference give rise to different interference properties of the light passes through the grating structure and to give rise the corresponding diffraction pattern. Since Gerritsen et al discloses that the diffractive structure gives rise to diffraction phenomena such criterion therefore are inherently met or easily modified. Claim 1 has been amended to include the feature regarding the gratings have saw-tooth section shape. Gerritsen et al teaches that the relief pattern of the gratings may assume saw-tooth wave shape, (please see column 5, lines 45-49).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2-7, newly added claims 9-10 and newly added claims 13-19 dependent therefrom claims one of claims 2-7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Gerritsen et al in view of the patent issued to Sakai et al (PN. 5,279,924) .

The volume diffraction structure comprises a pair of gratings taught by Gerritsen et al with details described for claims 1 and 11-12 above has met all the limitations of the claims. This reference however does not teach explicitly to have a chamfered shape for the peak regions and/or the valley regions of the grating grooves. Sakai et al in the same field of endeavor teaches an optical diffraction grating element wherein the grating element essentially has a saw-toothed shape or grooves with the peak regions and the valley regions being cut to form chamfered shape, (please see Figures 2, 3, 4 and 5). It would therefore have been obvious to one having ordinary skilled in the art to apply the teachings of Sakai et al to modify the diffractive structure

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of Gerritsen et al for the benefit of providing diffraction gratings having uniform diffraction efficiency throughout with respect to different incident angles of the incident light.

With regard to the feature concerning the diffractive structure being used in an optical system having a lens system, Sakai et al teaches that the optical grating may be used in an optical head system which inherently includes a lens system. Gerritsen et al also teaches that the diffractive structure is good for incident light having wavelengths in the range of all the visible wavelengths. Although these references do not teach explicitly that the pair of gratings are made of resin however since resin are very well known materials used in the field to make optical elements such as diffraction grating such modifications would have been obvious to one skilled in the art. With regard to the actual size of the chamfered shape, ie the land width W and the tilted angle Θ , the Sakai et al reference does not teach explicitly about the actual value of the sizes, however it is understood that they have to be comparable with respect to the design wavelength in order to produce the desired phase modulation. To obtain the desired values of the size would therefore have been an obvious modifications to one skilled in the art since it has been held where the general conditions of a claim are disclose in the art, discovering the optimum or workable ranges involves only routine skilled in the art. In re Aller, 105 USPQ 233.

11. Claims 13-19 that are dependent from either one of claims 1, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Gerritsen et al.

The diffractive structure comprising a pair of diffraction gratings taught by Gerritsen et al described for claims 1, 11 and 12 above has met all the limitations of the claims with the exception that it does not teach explicitly that the diffractive structure is used in an optical system including a lens system. However it is extremely well known in the art to include a diffractive structure in an optical system with a lens system for

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the purpose of correcting the aberrations of the lens system. Such modification would therefore have been obvious to one skilled in the art. Gerritsen et al also teaches that the diffractive structure is good for incident light having wavelengths in the range of all the visible wavelengths. Although these references do not teach explicitly that the pair of gratings are made of resin however since resin are very well known materials used in the field to make optical elements such as diffraction grating such modifications would have been obvious to one skilled in the art. With regard to the actual size of the chamfered shape, ie the land width W and the tilted angle Θ , the Sakai et al reference does not teach explicitly about the actual value of the sizes, however it is understood that it has to be comparable with respect to the design wavelength in order to produce the desired phase modulation. To obtain the desired values of the size would therefore have been an obvious modifications to one skilled in the art since it has been held where the general conditions of a claim are disclose in the art, discovering the optimum or workable ranges involves only routine skilled in the art. In re Aller, 105 USPQ 233.

Response to Arguments

12. Applicant's arguments filed on February 14, 2000 have been fully considered but they are not persuasive. The newly amended claims and newly added claims have been fully considered and they are rejected for the reasons stated above.

In response to applicant's arguments which states that the maximum optical path length difference introduced by the gratings is not an inherent property, the examiner respectfully disagrees and wishes to refer the applicant to any standard text book for Optics concerning the diffraction phenomena. One will easily find out that the equation governing the diffraction phenomena for a grating structure is:

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(optical path length difference resulted by the diffraction grating structure) = $m \lambda$, with m being an integer indicates the m th order of diffraction and λ being the design wavelength.

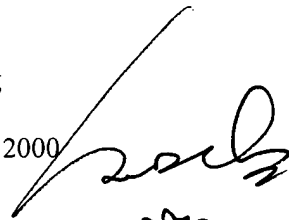
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Chang whose telephone number is (703) 305-6208.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Papers related to this application may be submitted to Group 2800 through facsimile transmission. Papers should be faxed to Group 2800 via PTO Fax Center (fax number 703-308-7722) located in Crystal Plaza 4.

A. Chang

April 27, 2000



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